

# ZEITSCHRIFT FÜR PFLANZENPHYSIOLOGIE

International Journal of Plant Physiology

Herausgegeben von

H. BEEVERS, Santa Cruz, Calif. · M. BOPP, Heidelberg · J. BRUINSMA, Wageningen ·  
F. CONSTABEL, Saskatoon · P. HALLDAL, Oslo · W. HAUPT, Erlangen ·  
D. HESS, Stuttgart-Hohenheim · O. KANDLER, München · R. KOLLMANN, Kiel ·  
W. LARCHER, Innsbruck · PH. MATILE, Zürich · P. E. PILET, Lausanne ·  
H. REZNIK, Köln · H. R. SCHÜTTE, Halle (Saale) · J. STRAUB, Köln ·  
C. P. WHITTINGHAM, Harpenden

Schriftleitung

W. LARCHER, Innsbruck

Band 107



GUSTAV FISCHER VERLAG  
STUTT GART · NEW YORK · 1982

The articles published in this journal are protected by copyright. All rights are reserved, especially the right to translate into foreign languages. No part of the journal may be reproduced in any form – through photocopying, microfilming or other processes – or converted to a machine language, especially for data processing equipment – without the written permission of the publisher. The rights of reproduction by lecture, radio and television transmission, magnetic sound recording or similar means are also reserved.

Photocopies for personal and other individual use may only be made as single copies of single articles or portions thereof. Every copy made within the realm of a commercial enterprise serves a commercial purpose in accordance with § 54 (2) of the copyright law of the Federal Republic of Germany and oblique payment of a fee to VG WORT, Abteilung Wissenschaft, Goethestr. 49, D-8000 München 2, to whom requests for the modalities of payment should be addressed.

© Gustav Fischer Verlag · Stuttgart · New York

1982

Alle Rechte vorbehalten

Calwer Druckzentrum Kirchherr und Sattler GmbH

Printed in Germany

ISSN 0044-328X

Contents

Original Papers

BEFFA, R. and P.-E. PILET: Growth and Gravireaction of Illuminated Maize Roots: Kinetic Analyses . . . . . 443

BERTANI, A. and I. BRAMBILLA: Effect of Decreasing Oxygen Concentration on Some Aspects of Protein and Amino-acid Metabolism in Rice Roots . . . . . 193

CARDEMIL, L. and M. JORDAN: Light and Electron Microscopic Study of *in vitro* Cultured Female Gametophyte of *Araucaria araucana* (Mol.) Koch . . . . . 329

CREPY, L., M.-C. CHUPEAU, and Y. CHUPEAU: The Isolation and Culture of Leaf Protoplasts of *Cichorium intybus* and Their Regeneration into Plants . . . . . 123

DAWIDOWICZ-GRZEGORZEWSKA, A., N. WEISMAN, C. THÉVENOT, and D. CÔME: Proteolysis and Dormancy Release in Apple embryos . . . . . 115

DONKIN, M. E., A. J. TRAVIS, and E. S. MARTIN: Stomatal Responses to Light and CO<sub>2</sub> in the *Argentum* Mutant of *Pisum sativum* . . . . . 201

DRESSLER, K., S. BIEDLINGMAIER, H. GROSSBERGER, J. KEMMNER, U. NÖLLE, A. RODMANIS-BLUMER, and D. HESS: Galactose Metabolism in *Petunia* . . . . . 409

FLEURIET, A. et A. DELOIRE: Aspects histochimiques et biochimiques de la cicatrisation des fruits de Tomate blesses.  
Histochemical and Biochemical Aspects of Cicatrization of Tomato Fruit Lesions 259

FOYER, C., D. WALKER, and E. LATZKO: The Regulation of Cytoplasmic Fructose 1,6-biophosphatase in Relation to the Control of Carbon Flow to Sucrose . . . . . 457

GRIERSON, D., R. J. KEAR, J. R. THOMPSON, and R. GARCIA-MORA: Stimulation of *in vitro* RNA Synthesis by Pretreating Plants with Auxins is Due to Auxin-Induced Ethylene Production . . . . . 419

GRILLI, I., M. C. ANGUILLI, P. MELETTI, and C. FLORIS: Influence of Age and Storage Temperature on RNA Metabolism in Durum Wheat Seeds . . . . . 211

HACHTEL, W.: Biosynthesis and Assembly of Thylakoid Membrane Proteins in Isolated Chloroplasts from *Vicia faba* L.: The P700-Chlorophyll a-Protein . . . . . 383

HANZELY, L. and K. HARMET: Effect of Lanthanum on Cell Wall Elongation in *Avena* Coleoptile Segments: Physiological and Ultrastructural Studies . . . . . 223

HEYSER, J. W. and M. W. NABORS: Long Term Plant Regeneration, Somatic Embryogenesis and Green Spot Formation in Secondary Oat (*Avena sativa*) Callus . . . . . 153

KAISER, G., E. MARTINOIA, and A. WIEMKEN: Rapid Appearance of Photosynthetic Products in the Vacuoles Isolated from Barley Mesophyll Protoplasts by a New Fast Method . . . . . 103

KAREGE, F., C. PENEL, and H. GREPPIN: Floral Induction in Spinach Leaves by Light, Temperature and Gibberellic Acid: Use of the Photocontrol of Basic Peroxidase Activity as Biochemical Marker . . . . . 357

KARTHA, K. K., N. L. LEUNG, and L. A. MROGINSKI: *In vitro* Growth Responses and Plant Regeneration from Cryopreserved Meristems of Cassava (*Manihot esculenta* Crantz) . . . . . 133

KASHYAP, A. K. and S. L. GUPTA: Effect of Lethal Copper Concentration on Nitrate Uptake, Reduction and Nitrite Release in *Anacystis nidulans* . . . . . 289

KASHYAP, A. K. and K. D. PANDEY: Inhibitory Effects of Ricefield Herbicide Machete on *Anabaena doliolum* Bharadwaja and Protection by Nitrogen Sources . . . . . 339



KHAFAGY, E. Z. and A. M. MOUSA: Nucleic Acids and Protein Metabolic Changes During Germination of Cotton Seed . . . . .	32
KLERK, G. J. DE: Differential Degradation of Early Synthesized Proteins in Dormant and Afterripened <i>Agrostemma githago</i> L. Embryos . . . . .	
KONDO, T.: Phase Control of the Potassium Uptake Rhythm by the Light Signals in <i>Lemma gibba</i> G3 . . . . .	39
LANE, S. D. and E. S. MARTIN: An Ultrastructural Examination of Lead Localisation in Germinating Seeds of <i>Raphanus sativus</i> . . . . .	38
LU, D. Y., D. PENTAL, and E. C. COCKING: Plant Regeneration from Seedling Cotyledon Protoplasts . . . . .	58
MARTINOIA, E., M. J. DALLING, and PH. MATILE: Catabolism of Chlorophyll: Demonstration of Chloroplast-localized Peroxidative and Oxidative Activities . . . . .	26
MEDINA, E.: Temperature and Humidity Effects on Dark CO <sub>2</sub> Fixation by <i>Kalanchoe pinnata</i> . . . . .	25
MIGINIAC-MASLOW, M. and A. HOARAU: Variations in the Adenylate Levels During Phosphate Depletion in Isolated Soybean Cells and Wheat Leaf Fragments . . . . .	42
MISSION, J. P., M. COUMANS, P. GIOT-WIRGOT, and TH. GASPARD: Induction de bourgeons adventifs sur bourgeons de <i>Picea pungens</i> en culture <i>in vitro</i> . Induction of Adventitious Buds on Buds of <i>Picea pungens</i> Grown <i>in vitro</i> . . . . .	161
PARGNEY, J.-C.: Etude des ultrastructures cellulaires au cours de la plasmolyse et de l'isolement des protoplastes issus de tubes polliniques d' <i>Iris pseudacorus</i> et de <i>Clivia nobilis</i> . Cellular Ultrastructures During Plasmolysis and After Protoplast Isolation from Pollen Tubes of <i>Iris pseudacorus</i> and <i>Clivia nobilis</i> . . . . .	237
PATNAIK, G. and E. C. COCKING: A New Enzyme Mixture for the Isolation of Leaf Protoplasts . . . . .	41
PEREIRA, M. F. A. and J. E. DALE: Effects of 2,4-Dichlorophenoxyacetic Acid on Shoot Apex Development of <i>Phaseolus vulgaris</i> . . . . .	169
REDENBAUGH, K., S. RUZIN, J. BARTHOLOMEW, and J. A. BASSHAM: Characterization and Separation of Plant Protoplasts Via Flow Cytometry and Cell Sorting . . . . .	65
RENNER, B. und E. GERSTNER: Stoffwechselunterschiede zwischen dem lichenisierten und dem isolierten Mycosymbionten von <i>Baeomyces rufus</i> (Huds.) Rebert. Metabolic Differences Between the Lichenized and the Isolated Mycosymbiont of <i>Baeomyces rufus</i> (Huds.) Rebert. . . . .	47
ROHWER, F. and J. SCHIERLE: Effect of Light on Ethylene Production: Red Light Enhancement of 1-Aminocyclopropane-1-carboxylic Acid Concentration in Etiolated Pea Shoots . . . . .	295
RÜCKER, W.: Kombiniertes Einfluß von Indolessigsäure, Gibberellin und Benzylaminopurin auf Kallus- und Organdifferenzierung an Blattexplantaten von <i>Digitalis purpurea</i> . Combined Influence of Indolacetic Acid, Gibberellic Acid and Benzylaminopurine on Callus and Organ Differentiation in <i>Digitalis purpurea</i> Leaf Explants . . . . .	141
RYC, M. and ST. LEWAK: Hormone Interactions in the Formation of the Photosynthetic Apparatus in Dormant and Stratified Apple Embryos . . . . .	15
SCHMIDT, A.: A Cysteine Desulhydrase Specific from Spinach Leaves for D-Cysteine . . . . .	301
SCHÖNWITZ, R. and H. ZIEGLER: Exudation of Water-soluble Vitamins and of Some Carbohydrates by Intact Roots of Maize Seedlings ( <i>Zea mays</i> L.) into a Mineral Nutrient Solution. . . . .	7

STEINGRÖVER, E., R. OOSTERHUIS, and F. WIERINGA: Effect of Light Treatment and Nutrition on Nitrate Accumulation in Spinach ( <i>Spinacia oleracea</i> L.) . . . . .	97
TONELLI, C., M. L. RACCHI, G. GAVAZZI, and G. BERETTA: <i>In vitro</i> Expression of Proline-requiring Mutants in <i>Zea mays</i> L. . . . .	437
VAIRINHOS, F. and D. R. MURRAY: Variation in the Sizes of Both Large and Small Disulphide-linked Subunits of Legumin in Representatives of Viciaeae and Cicer . . . . .	25
VERGARA, M. R., G. BIASINI, F. LO SCHIAVO, and M. TERZI: Isolation and Characterization of Carrot Cell Mutants Resistant to $\alpha$ -Amanitin . . . . .	313
WARREN, R. S. and A. R. GOULD: Salt Tolerance Expressed as a Cellular Trait in Suspension Cultures Developed from the Halophytic Grass <i>Distichlis spicata</i> . . . . .	347
XU, Z-H., M. R. DAVEY, and E. C. COCKING: Organogenesis From Root Protoplasts of the Forage Legumes <i>Medicago sativa</i> and <i>Trigonella foenum-graecum</i> . . . . .	231

## Short Communications

CHETAL, S., D. S. WAGLE, and H. S. NAINAWATEE: Lipid Changes in Two Cultivars of Wheat and Barley During Leaf Development . . . . .	187
DALESSANDRO, G. and L. MASTROPASQUA: Effects of Zeatin, Fusicoccin and Zeatin-Fusicoccin Treatments on Cell Wall Polysaccharide Biosynthesis During Expansion Growth in Excised Radish Cotyledons . . . . .	467
DUMORTIER, F. M. and J. C. VENDRIG: Comparison Between the Effect of Dimethylformamide and Red Light on Anthocyanin Synthesis in Seedlings of <i>Vigna radiata</i> (L.) Wilczek . . . . .	379
GALVÁN, F., F. CALERO, and J. M. ROLDÁN: Effect of Different Reductants and Inhibitors on the Redox State of Cytochrome <i>b</i> -557 From Spinach Leaf Nitrate Reductase . . . . .	473
GÜLZ, P.-G., M. ROSINSKI und C. EICH: Zusammensetzung der Epikutikularwachse von <i>Halimium halimifolium</i> (Cistaceae). Composition of Epicuticular Waxes from <i>Halimium halimifolium</i> (Cistaceae) . . . . .	281
HESS, D., E.-M. GÖTZ, and M. HARFOLD: <i>Rhizobium</i> sp. 32H1 Associated with Wheat and Petunia: Invasion of Plant Root Tissue . . . . .	81
KANDASAMY, M. K. and M. VIVEKANANDAN: Promotion of <i>in vitro</i> Pollen Germination of <i>Cyamopsis tetragonoloba</i> by Stigmatic Exudate of <i>Vigna catjung</i> . . . . .	373
KOHLNBACH, H. W., M. KÖRBER, and LIANG-CAI LI: Cytodifferentiation of Protoplasts Isolated from a Stem Embryo System of <i>Brassica napus</i> to Tracheary Elements . . . . .	367
PREY, TH., A. MESSLER und E. BANCHER: Beitrag zur Bestimmung der Nitrat-reduktaseaktivität in Zuckerrübenblättern. Contribution to the Determination of Nitrate Reductase Activity in Leaves of Sugar Beet . . . . .	183
RAM, H. Y. M. and R. SETT: Reversal of Ethephon-Induced Feminization in Male Plants of <i>Cannabis sativa</i> by Ethylene Antagonists . . . . .	85
VAN LEYVELD, L. J. and E. NEL: Ethylene Concentration and Polyphenol Oxidase Activity in Mango ( <i>Mangifera indica</i> L.) Fruit Abscission . . . . .	179
VAN STEVENINCK, R. F. M., M. E. VAN STEVENINCK, R. STELZER, and A. LÄUCHLI: Variations in Vacuolar Solutes of <i>Lupinus luteus</i> L. Leaf Tissue Shown by Electron Probe X-ray Microanalysis . . . . .	91



## Authors Index

- ANGUILLES, M. C. 211  
 BANCHER, E. 183  
 BARTHOLOMEW, J. 65  
 BASSHAM, J. A. 65  
 BEFFA, R. 443  
 BERETTA, G. 437  
 BERTANI, A. 193  
 BIASINI, G. 313  
 BIEDLINGMAIER, S. 409  
 BRAMBILLA, I. 193  
 CALERO, F. 473  
 CARDEMIL, L. 329  
 CHETAL, S. 187  
 CHUPEAU, M.-C. 123  
 CHUPEAU, Y. 123  
 COCKING, E. C. 41, 59, 231  
 CÔME, D. 115  
 COUMANS, M. 161  
 CREPY, L. 123  
 DALE, J. E. 169  
 DALESSANDRO, G. 467  
 DALLING, M. J. 269  
 DAVEY, M. R. 231  
 DAWIDOWICZ-GRZEGORZEWSKA, A. 115  
 DELOIRE, A. 259  
 DONKIN, M. E. 201  
 DRESSLER, K. 409  
 DUMORTIER, F. M. 379  
 EICH, C. 281  
 FLEURIET, A. 259  
 FLORIS, C. 211  
 FOYER, C. 457  
 GALVÁN, F. 473  
 GARCIA-MORA, R. 419  
 GASPARD, Th. 161  
 GAVAZZI, G. 437  
 GERSTNER, E. 47  
 GIOT-WIRGOT, P. 161  
 GÖTZ, E.-M. 81  
 GOULD, A. R. 347  
 GREPPIN, H. 357  
 GRIERSON, D. 419  
 GRILLI, I. 211  
 GROSSBERGER, H. 409  
 GUPTA, S. L. 289  
 GÜLZ, P.-G. 281  
 HACHTEL, W. 383  
 HANZELY, L. 223  
 HARFOLD, M. 81  
 HARMET, K. 223  
 HESS, D. 81, 409  
 HEYSER, J. W. 153  
 HOARAU, A. 427  
 JORDAN, M. 329  
 KAISER, G. 103  
 KANDASAMY, M. K. 373  
 KAREGE, F. 357  
 KARTHA, K. K. 133  
 KASHYAP, A. K. 289, 339  
 KEAR, R. J. 419  
 KEMMNER, J. 409  
 KHAFAGY, E. Z. 321  
 KLERK, G. J. DE 1  
 KÖRBER, M. 367  
 KOHLENBACH, H. W. 367  
 KONDO, T. 395  
 LÄUCHLI, A. 91  
 LANE, S. D. 33  
 LATZKO, E. 457  
 LEUNG, N. L. 133  
 LEWAK, S. 15  
 LIANG-CAI LI 367  
 LO SCHIAVO, F. 313  
 LU, D. Y. 59  
 MARTIN, E. S. 33, 201  
 MARTINOIA, E. 103, 269  
 MASTROPASQUA, L. 467  
 MATILE, Ph. 269  
 MEDINA, E. 251  
 MELETTI, P. 211  
 MESSLER, A. 183  
 MIGINIAC-MASLOW, M. 427  
 MISSON, J. P. 161  
 MOUSA, A. M. 321  
 MROGINSKI, L. A. 133  
 MURRAY, D. R. 25  
 NABORS, M. W. 153  
 NAINAWATEE, H. 187  
 NEL, E. 179  
 NÖLLE, U. 409  
 OOSTERHUIS, R. 97  
 PANDEY, K. D. 339  
 PARGNEY, J.-C. 237  
 PATNAIK, G. 41  
 PENEL, C. 357  
 PENTAL, D. 59  
 PEREIRA, M. F. A. 169  
 PILET, P.-E. 443  
 PREY, Th. 183  
 RACCHI, L. 437  
 RAM, H. Y. M. 85  
 REDENBAUGH, K. 65  
 RENNER, B. 47  
 RODMANIS-BLUMER, A. 40  
 ROHWER, F. 295  
 ROLDÁN, J. M. 473  
 ROSINSKI, M. 281  
 RÜCKER, W. 141  
 RUZIN, S. 65  
 RYĆ, M. 15  
 SCHIERLE, J. 295  
 SCHMIDT, A. 301  
 SCHÖNWITZ, R. 7  
 SETT, R. 85  
 STEINGRÖVER, E. 97  
 STELZER, R. 91  
 TERZI, M. 313  
 THÉVENOT, C. 115  
 THOMPSON, J. R. 419  
 TONELLI, C. 437  
 TRAVIS, A. J. 201  
 VAIRINHOS, F. 25  
 VAN LEYVELD, L. J. 179  
 VAN STEVENINCK, M. E. 91  
 VAN STEVENINCK, R. F. M. 91  
 VENDRIG, J. C. 379  
 VERGARA, M. R. 313  
 VIVEKANANDAN, M. 373  
 WAGLE, D. S. 187  
 WALKER, D. 457  
 WARREN, R. S. 347  
 WEISMAN, N. 115  
 WIEMKEN, A. 103  
 WIERINGA, F. 97  
 XU, Z.-H. 231  
 ZIEGLER, H. 7